

Text 4 Health: The Use of Text Message Reminder-Recalls to Counter Disparities in Adolescent Immunization Coverage

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I. Introduction

A. Nature of the research problem

In the past few years, three new vaccines have been added to the routine adolescent immunization schedule. The Advisory Committee on Immunization Practices (ACIP) recommends that the tetravalent meningococcal polysaccharide-protein conjugate vaccine (MCV4), tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine (Tdap), and human papillomavirus vaccine (HPV) all be administered to children 11-12 years of age.¹ These vaccines have the potential to greatly improve the health of our youth, by preventing meningitis, pertussis, cervical cancer and its dysplastic precursors. In order for these new vaccines to have the greatest impact, immunization coverage must be high. Recently published data from the National Immunization Survey-Teen have shown coverage rates of Tdap, MCV4 and HPV to lag behind those for early childhood vaccines.²

B. Purpose, scope, and methods of the investigation

The goals of ***Text 4 Health: The Use of Text Message Reminder-Recalls to Counter Disparities in Adolescent Immunization Coverage*** were to develop, implement, and evaluate two unique text message immunization reminder-recall systems in 9 pediatric clinical sites in New York City. Our comprehensive project included 3 stages: *pre-intervention*, *intervention* and *post-intervention*. Briefly, the *pre-intervention* stage included technology and protocol development, assessment of parental interest and readiness for text message reminders via focus groups, and refinement of text message content. In the *pre-intervention* stage we also evaluated the relationship between HPV vaccination and provision of other medical services. In the *intervention* stage we implemented two unique text message reminder-recall systems for adolescent immunizations. One was a *registry-linked* intervention in which parents of adolescents ages 11-18 who needed either Tdap or MCV4 and who had a visit to academic health clinic intervention site in the previous 12 months were texted to return to their medical home for a vaccine. The second intervention was an *opt-in* intervention, parents of adolescents girls who received their first or second HPV dose (HPV1 or HPV2) at one of nine participating clinical sites were given instructions on how to sign up for text message reminders for the next vaccine dose. In the *post-intervention* stage we surveyed administrators and providers regarding their satisfaction with this intervention.

C. Nature of the findings

Pre-intervention: We conducted focus groups and individual interviews with parents of adolescents. Parents uniformly expressed interest in receiving text messages from their child's medical provider. In a chart review we found that HPV vaccine administration was associated with provision of other general medical and preventive health services.

Intervention: Compared to control populations, both text message reminder-recall interventions were associated with increased rates of receiving one or more needed vaccines. These increases in immunization rates were sustained for several months following the intervention.

Post-intervention: We found that administrators and providers generally liked the text messaging service.

II. Review of the Literature

Adolescents have traditionally been a challenging group to immunize. Infrequent preventive health visits, scattered medical records, and missed opportunities have all contributed to low immunization coverage among teens.³ The National Vaccine Advisory Committee⁴, the Task Force on Community Preventive Services⁵, and the American Academy of Pediatrics⁶ among others, recommend immunization reminder-recall systems as important for promoting vaccine uptake. Reminder-recalls can be conducted via a variety of mechanisms, including automated phone calls, mailings, or personal phone calls. In a meta-analysis by Jacobson et al., across differing populations and varied practice settings, reminder-recalls were associated with 5-20% increase in immunization coverage.⁷ However, in a recent practice-based intervention that specifically targeted adolescents, phone reminder-recalls were only associated with a 4% increase in Hepatitis B vaccine completion.⁸

One novel approach to immunization reminder-recalls is through cellular phone text messaging. The majority of U.S. patients have cell phones and the number of text messages sent has steadily increased.⁹ Thus, using text messages to remind parents of recommended immunizations may be a feasible approach to improving immunization coverage for a large sector of our population. Only one published study from Spain, by Vilella et al., has reported specifically on their experience with text message immunization reminders.¹⁰ This study reported a substantial improvement associated with text message reminders; adult travelers who received text messages had 8-20% increase in their rates of receipt of their next Hepatitis A or Hepatitis B vaccine dose.

III. Study Design and Methods

Pre-intervention: To assess parental interest and readiness for text message immunization reminder-recalls, we conducted 2 English and 2 Spanish language focus groups and 5 individual interviews with 28 parents. Parents of adolescents 10-19 years of age were recruited from the waiting rooms of 7 pediatric clinical sites (5 academic health clinics and 2 private practices in New York City). Focus groups and interviews were conducted by experienced moderators. Using a structured guide, topics covered included barriers to immunization, preferences for and acceptability of text message immunization reminder-recalls. Focus groups and interviews were recorded and professionally transcribed. Utilizing content analysis, all transcripts were reviewed and independently coded by two team members; codes were then reviewed by the other team members. Using an iterative process, dominant themes emerged.

To evaluate the relationship between HPV vaccination and provision of other health services, we conducted a chart review for girls 9-20 years of age (n=571), who received HPV2 or HPV3 within 4 months of its due date at one of 9 pediatric clinical sites (5 academic health clinics and 4 private practices in New York City). Logistic regression was used to evaluate the impact of site of care and vaccine timeliness on delivery of other health services.

Interventions: For the *registry-linked* reminders, we conducted a randomized intervention with urban adolescents (n= 195) and age, gender matched controls (n=166)

in need of meningococcal (MCV4) and/or tetanus, diphtheria, acellular pertussis (Tdap) vaccines. Two intervention and four control sites were assigned to provide comparable baseline adolescent populations and MCV4 and Tdap coverage rates. Sites were part of the same practice network, serving primarily minority, publicly insured patients. Parents or guardians of adolescents aged 11-18 years old with a visit in the previous 12 months to one of the study sites, in need of MCV4 (meningococcal) and/or Tdap (tetanus, diphtheria, acellular pertussis) vaccines, and with a cell phone number recorded in the registration system were eligible. Using a computer algorithm, each week a random sample of eligible adolescents from the intervention sites were selected from EzVac (our hospital affiliated immunization registry). Intervention adolescents were then matched by gender and age to randomly selected eligible adolescents from the control sites. Using a text-messaging platform linked to EzVac, parents of adolescents received personalized text message immunization reminders. The main outcome was receipt of an additional vaccine (MCV4 and/or Tdap) at 4, 12 and 24 weeks of receipt of the first text message; secondary outcomes included receipt of any additional vaccine. Proportional differences in coverage rates between intervention and control groups were analyzed using Chi-square tests. Intention-to-treat analyses were conducted in which all subjects were analyzed according to their assigned group. In addition, multivariable logistic regression analyses were used to assess the impact of age, gender, race/ethnicity, insurance status and language on the efficacy of the intervention.

For the *opt-in* intervention, text message reminders were offered at all nine pediatric clinical sites (5 academic health clinics and 4 private practices in New York City) during a six-month intervention period, January through June 2009. For all adolescents 9-20 years who received HPV1 or HPV2 during the intervention period, the nurse or physician administering the HPV vaccine offered parents an enrollment card with instructions on how to sign up for text message reminders for the next vaccine dose. Parents who enrolled received up to three weekly text message reminders that their daughter was due for her next vaccine dose, starting 3 weeks before its due date. Our primary outcome was the proportion of adolescent girls who received their next vaccine dose on-time, within one month of its due date. As a secondary outcome, we compared receipt of next vaccine dose within 4 months of its due date among these same three groups. To measure the impact our text messaging intervention, we compared on-time receipt of next vaccine dose among adolescents whose parents signed up for text message reminders versus two control groups: Control Group 1 –Opt-out: adolescent girls who received the enrollment card during the intervention period but did not sign up and Control Group 2 - Historical: adolescent girls who received HPV1 or HPV2 during the control period, prior to the start of our intervention. Two-way comparisons were made, (Intervention versus Opt-out controls and Intervention versus Historical Controls) using Chi-square testing, with significance set at $p < .05$. In addition, multivariable logistic regression analyses were used to assess the impact of insurance status and site of care on the efficacy of the intervention.

Post-intervention

Provider and administrator surveys were designed. Questions were primarily closed ended with a few open ended questions regarding further suggestions and opinions. The instruments were pretested before finalized. The surveys were verbally administered at seven of the study sites. Descriptive analyses were conducted.

IV. Detailed Findings

Pre-intervention: Parents participating in our focus groups and individual interviews (n=28) ranged in age from 30-64 years ($x = 44.6$, $sd = 9$) and were ethnically diverse (4 African American, 18 Hispanic, 4 white, 1 Asian, 1 other). Over half (57%) completed college, 29% graduated high school, and 14% did not complete high school. Most (86%) reported previously receiving a text message, but only one parent had received a text message from a medical provider. Most parents reported their texting frequency to be once per week or less.

Parents described their busy home and work lives, unfamiliarity with adolescent vaccine recommendations and practice-related factors as barriers to timely immunization. They reported relying on annual physicals, vaccine cards, provider recommendation, and school requirements to keep up to date with immunizations. Parents were uniformly interested in receiving text message immunization reminders and many preferred them over mail or phone reminders. Parents suggested that reminders should be simple, short and personalized. In general, parents felt that they would act on these text messages. Potential problems with text message reminders, noted by a minority of parents, were cost and difficulty using cell phones. In an interactive exercise, most parents were able to retrieve sample text messages, read and understand their content, but many were unable to reply.¹¹

In our evaluation of the relationship between HPV vaccination and general health care delivery, we found that over half (58%) of adolescents received another medical or preventive health service at the time of HPV2 or HPV3 vaccine administration. Delivery of medical and preventive health services varied widely by practice site and by type of service. At private practices, patients returning for their next HPV vaccine dose were most likely to receive another vaccine (25%) while at academic health centers, patients most commonly received one or more general medical services (59%). All medical and preventive health services were more commonly delivered at academic health centers versus private practices. Most common services were one or more other vaccines (36%) or medical services (52%). Older teens were more likely to receive reproductive health services, STI screening, and other medical services. After controlling for age, receiving care at an academic health center ($OR = 4.0$, 95% $CI = 2.6-6.2$) and receiving the next vaccine dose 1-4 months after its due date ($OR = 2.5$, 95% $CI = 1.6-3.8$) were both strongly associated with increased odds of receiving other medical or preventive health services at follow-up.

Intervention: In the *registry-linked* intervention, 195 parents of adolescents were randomized to the intervention group and 166 to the control group. Intervention and control adolescents were primarily Latino and publicly insured. There were no significant differences between intervention and control adolescents by age, gender, self-identified race/ethnicity, insurance status or language of preference. A total of 821 text messages were sent and 7 bounced back; five families opted out. The median number of messages needed before an adolescent received a needed vaccine was 3. There was a 10.7% (95% CI 4.8%-16.5%) point difference in receipt of MCV4/Tdap vaccine at 4 weeks post initiation of intervention between intervention adolescents and controls (14.9% vs. 4.2%; $p < .01$). At 12 weeks, a 12.3% (95% CI 4.4%- 20.4%) point difference (25.6% vs. 13.3%; $p < .01$). At 24 weeks, a 17.9% (95% CI 9.1%- 26.8%) point difference (35.4 vs. 17.5%; $p < .001$). Multivariable analyses controlling for age, gender, race/ethnicity, insurance

status and language, at 4, 12 and 24 weeks post-intervention, found intervention status as the only factor associated with receipt of an additional adolescent vaccine (MCV4/Tdap) (AOR 4.41, 95% CI 1.76, 11.03; AOR 2.18, 95% CI 1.23, 3.87; AOR 2.48, 95% CI 1.48, 4.15, respectively). Similarly, only intervention status was significant for receiving any additional vaccine (AOR 3.66, 95% CI 1.69, 7.93) at 4 weeks; at 12 weeks (AOR 2.02, 95% CI 1.21, 3.38), and at 24 weeks (AOR 1.76, 95% CI 1.11, 2.79). Given the sample size and the effect size achieved, the power in the study at 4, 12, and 24 weeks was 93.4%, 83.8% and 99.3% respectively.

For the *opt-in* intervention, during the six-month intervention period, across the nine participating clinical sites, 364 adolescent girls received HPV1 and 401 received HPV2. Of the 765 eligible HPV vaccine events, 434 sign-up cards were distributed (56.7% of doses), and 128 (29.5% of those handed cards) signed up for the text message reminders. The proportion of eligible subjects handed a sign-up card and the proportion signing up for reminders varied widely by site (21-81% and 16-60%, respectively). Four patients who signed up for text message reminders were excluded post-hoc as there was no link between their PIN and their name or MRN and they could not be reached by phone, making it was impossible to evaluate whether they returned for their next vaccine dose. Thus, the final intervention population was comprised of 124 adolescent girls (28.6% of those handed cards). Sixty-eight signed up for reminders after receiving HPV1 (55%) while 56 signed up after HPV2 (45%). Subjects were primarily publicly insured and their mean age was 14.2 years. A sizable minority identified as Spanish-speaking. Control Group 1 – Opt-out, was comprised of subjects receiving HPV1 or HPV2 during the intervention period who were handed a sign-up card but did not sign up for reminders. The 306 adolescents in this cohort had a mean age of 14.1 years and were primarily publicly insured. This cohort was more likely than the intervention group to receive care at one of the five clinical sites affiliated with an academic health center (91.6% versus 83.1%). Control Group 2 – Historical, was comprised of subjects who received HPV1 or HPV2 at one of the nine participating sites in the six months prior to the intervention period (July-December 2008). The 1080 historical control subjects had a mean age of 14.1 years and were more likely than the intervention subjects to be uninsured.

Adolescents whose parents signed up for text message reminders were significantly more likely than the control populations to receive their next HPV vaccine dose on time – within one month of its due date. Comparing those who signed up versus the opt-out control population, on-time receipt of next HPV vaccine dose occurred among 51.6% versus 35.0% of adolescents ($p=.001$). Similarly, among the historical controls, on-time receipt of next vaccine dose was noted for 38.1% ($p=.003$). At four months following the vaccine due date, the intervention population was still significantly more likely than the control populations to have returned for the next vaccine dose. Comparing those who signed up versus the opt-out control population, receipt of next HPV vaccine dose within 4 months of its due date occurred among 64.5% versus 51.1% of adolescents ($p=.011$). Similarly, among the historical controls, receipt of next vaccine dose within 4 months of its due date was noted for 52.9% ($p=.014$). Using a logistic regression model, after controlling for insurance and site of care, we found that intervention subjects were 1.83 (95% CI 1.23-2.71) times more likely than either control population to receive their next HPV vaccine dose on-time ($p=.003$).

Post-Intervention:

Administrator Survey: A total of seven practice leaders were interviewed to gauge their opinions and concerns about the Text4Health intervention implemented at their practices, including three medical directors, two practice administrators, an office manager and a supervising RN. Three quarters of administrators were satisfied with the cell phone based immunization reminder texts implemented by the Text 4 Health intervention, with 43% being satisfied with the system and 29% being very satisfied. Out of those responding favorably, 43% found it to be consumer friendly and easy to carry out, 29% said that the text message immunization reminder recalls took less time, and 29% said it lessened the burden on the staff.

When asked about any problems encountered with the system, 29% complained of confusion and misunderstanding, 14% mentioned associated additional costs, particularly associated with taking related phone calls, and 14% reported various other concerns such as longer waiting times, scheduling problems, shortage of vaccines, and shortage of staff. Only one supervisor reported a moderate problem in responding to calls by parents in response to reminder text messages, with a maximum of 10 minutes taken per day to attend to such calls. Approximately, one third reported a moderate increase in the number of vaccinations being given in response to the text message reminders. Most (86%) reported no additional costs and 72% said it did not take any additional time to carry out.

For the *opt-in* study where reminder cards for the second and third dose of the human papilloma virus (HPV) vaccine were handed out, in 86 percent of the practices, the RNs/LPNs handed out the HPV cards, while in the remaining a MD/NP/PA handed them out. Only in one practice were the HPV cards were also handed out at the front desk. The majority (86%) of the practices reported no problem in handing out and educating the parents with a maximum of 5 minutes taken to hand out the cards.

Provider survey: A total of fourteen providers were also interviewed to ask about their experiences and suggestions for improvement of the text message reminder recalls and HPV cards enrollment system. The majority (79%) of providers interviewed were satisfied with the cell phone based immunization reminder texts. Almost half (43%) of those who were satisfied liked the text message immunization reminder system because it was consumer friendly, 29% said it was easy to carry out with lesser burden on the staff, and 7% thought it took less time. Half of the providers had other reasons for liking the system, such as being able to find patients who had missed vaccines and getting patients to come in for vaccines who would otherwise not come.

Of the problems encountered with the text message reminder recalls, 21% reported confusion / misunderstanding and additional time needed by the reminders, and 14% had problems with additional burden and responsibility. Half reported other problems such as the vaccination database being incomplete, misidentified patients, parents came in thinking it was an emergency, adolescents coming in without parental consent, simultaneous overburden with the flu vaccines, forgetting to pass out the cards, and that signup explanation was not a part of their routine. Many (57%) reported no problems by the office to attend to calls by parents in response to reminder text messages, and only 14% reported a moderate problem, with a maximum of 5 minutes spent per day to attend to such calls. Half of the providers reported an average increase in the number

of vaccinations being given as a result of the text message immunization reminders, with 29% of them reporting a moderate increase.

When asked about the HPV cards, 86% of the respondents had handed out the cards, with a maximum of 5 minutes spent to hand out a card. Most (71%) reported no problem in handing out the cards, while 14% had a small problem. One fifth (21%) mentioned problems due to the time taken to educate the parents, 7% reported problems with the time taken to train the staff, and 29% reported other problems such as mislabeling of a card, decreased availability of cards in Spanish language, need for accessible calendars preferably on the cards, and forgetting to pass out the cards.

A few suggestions and concerns were also put forth to improve the Text4Health reminder recall system. Providers liked the system and some thought it should be a regular feature for other vaccines and visit reminders, as well as expanded to other age groups. It was also suggested that the study needs continue longer for more people to enroll and there was a concern as to what will be the future of this program and who will continue the service. Some providers had suggestions for optimal time of the year for text messaging, suggesting that particularly for adolescents, it might be more effective if carried out from May to September when most adolescents come for care and school physicals. This was a problem for the particular year of the study since the clinics were overwhelmed in May and June with the 2009 H1N1 epidemic. It was also suggested that the walk in times listed in the text messages coincide with the days when adolescent doctors were in the clinic. The walk in times had been decided by the medical directors and nursing staff at each site based on when the nurses could accommodate vaccine walk-ins, but may not have accounted for the physicians schedules. Providers felt that it was better when enrollment occurred automatically without needing to call a phone number.

V. Discussion and Interpretation of Findings

A. Conclusions

In this multi-phase study we demonstrated the feasibility and efficacy of text message immunization reminders for adolescents. In our baseline qualitative work, we found parents to be uniformly interested in receiving text message reminders from the child's medical provider. In our intervention phase we tested two unique strategies for conducting text message reminders. In the registry-linked method, adolescents in need of Tdap or MCV4 were identified automatically through a query of our hospital-based immunization registry. Compared to our control group, adolescents whose parents were texted had sustained increases in receipt of one or more needed vaccines (18% at 24 weeks). Similarly, in our opt-in intervention, compared to two different control populations, adolescent girls whose parents signed up for text message reminders had a 13-16% increase in rates of return for their next vaccine dose. In our provider and administrator surveys we found that administrators and providers reported high satisfaction with the text messaging service.

In summary, our research supports the implementation of text message immunization reminders. When feasible, we encourage automated processes, linked to an immunization registry or electronic medical record. However, our *opt-in* intervention could easily be adapted to any clinical setting. Furthermore, from our baseline chart review we conclude that promoting adherence with HPV vaccination may improve delivery of other health services for adolescents. We observed that more than half of

girls returning for their next HPV vaccine dose receive other general health or preventive services at their return visit.

B. Explanation of study limitations

Several limitations to this research should be noted. First, our research project was limited to an urban population in the Northeast. Furthermore, while we were able to include a range of practice settings (academic health clinics and private practices) all were affiliated with a single hospital system. Widespread regional variation in adolescent immunization coverage has been observed. Barriers to immunization and strategies that effectively promote immunization may vary in other regions.

Second, neither of our interventions was conducted as a randomized trial. It is possible that our comparison/control populations differed from our intervention groups in important ways that could not be controlled for in our analyses. In our *registry* intervention, eligible subjects were randomly selected from two intervention sites and then matched by age and gender to subjects randomly selected from four control sites. We chose not to randomize at the individual level to avoid carry-over effect, in which parents in the intervention group could raise vaccine awareness among providers who are also immunizing controls. For the *opt-in* intervention, randomization would have created practical barriers and greatly increased the costs of the study. Furthermore, we wanted to observe how parents would respond when their treating provider offered the enrollment card – as this best reflects the efficacy of our intervention outside of a research setting.

Another limitation of the *registry* intervention was that we measured receipt of a needed adolescent vaccine among a sample of adolescents rather than changes in immunization coverage across entire clinic population. This approach was chosen to avoid overwhelming the clinical sites by recalling too many patients in a short time interval. As we assessed the impact of the intervention among adolescents who were in need of a vaccination, the baseline coverage rates were 0%. However, this approach may make it more difficult to compare our findings with other reminder-recall studies that reported changes in population-level immunization coverage. Future studies could build upon the findings we report by including a population-based methodology.

Additionally, in neither study did we employ an active control group. In both we compared an intervention population, who received text message immunization reminder-recalls, to a control population who received no intervention. While this type of comparison is common in studies of immunization reminder-recalls, our research design may have led us to overestimate the impact of our interventions. Finally, due to concerns regarding minor participation in research, in both interventions, parents were texted. As teens are more likely than their parents to be text-savvy, it is likely that texting the teens directly would be as effective, if not more so.

C. Comparison with findings of other studies

The efficacies that we report are similar, if not better, than those reported in previous traditional reminder-recall efforts. In a meta-analysis by Jacobson et al., across differing populations and varied practice settings, reminder-recalls were associated with 5-20% increase in immunization coverage.⁷ However, in a recent practice-based intervention that specifically targeted adolescents, phone reminder-recalls were only associated with a 4% increase in Hepatitis B vaccine completion.⁸ The favorable efficacy

of our reminder-recall intervention may, in part, be attributable to our method for contacting parents – text messages. Traditional mail or phone reminders can be costly and in previous studies their impact has been lessened due to changing address or phone numbers. Currently, 91% of US adults own a mobile phone and an increasing number of homes are now exclusively wireless.⁹ In our focus groups, parents reported text messages would be more likely than other modes of communication (traditional mail, email or phone) to grab their attention.¹¹ Thus, text messaging may be a simple and effective strategy to remind teens and their parents of a needed vaccine.

D. Possible application of findings to actual MCH health care delivery situations

Based on our research, which demonstrated both the acceptability and efficacy of text messaging to improve health, we support the implementation of text message immunization reminder recalls for MCH populations. While some medical records and immunization registries are currently configured to query vaccine status and transmit automated text messages, for others additional technology input will be needed. Furthermore, efforts to promote increased reporting to immunization registries will improve our ability to identify and notify those who are in need of vaccination. Our *opt-in* intervention is also promising. This type of intervention does not rely on any linkage to an immunization registry or use of an electronic medical record. Thus, this type of system could be implemented in lower resource settings or at alternative sites for vaccination.

E. Policy implications

In New York City providers are mandated to report to the citywide immunization registry. Furthermore, Vaccines for Children (VFC) quarterly reports are generated automatically through registry reporting. Thus, vaccine reporting rates are quite high. Unfortunately, in other regions, immunization registries have much lower reporting rates. Our research, which highlights how an immunization registry can be utilized to effectively promote immunization coverage, highlights the importance of promoting policies to improve registry reporting. We encourage the Maternal and Child Health Bureau to support policies to improve the transfer of vaccine data between electronic health records and immunization registries and to increase provider incentives to report administered vaccines to an immunization registry.

F. Suggestions for further research

Text4health is one of the first studies to implement and evaluate the use of text message reminder-recalls for adolescent immunizations. We strongly encourage continued research of this type. Future studies should evaluate text messaging in more geographically diverse populations and for different vaccines. In addition, future studies could further optimize the content and timing of messages.

Second, data on the cost-effectiveness of text messaging interventions is needed. This data will help large health care systems or immunization registries determine whether to invest in developing such systems. In our initial proposal we had planned to conduct cost-effectiveness analyses. While we did conduct simple incremental cost-effectiveness analyses, we have not reported them to date. Instead, we plan to conduct more extensive cost-benefit analyses – these will be completed in the next few months.

VI. List of products

Results of Text4Health have been widely disseminated through publications and presentations at national conferences. To date, findings from our focus groups were presented as an oral presentation at the 2009 Society for Adolescent Medicine Annual Meeting (March 2009, Los Angeles, California) and they were published in the American Journal of Public Health (Text4Health: A qualitative evaluation of parental readiness for text message immunization reminders. American Journal of Public Health. 2009; 99(12):2176-8.) In addition, this article resulted in a published response letter (Response: Text4Health: A qualitative evaluation of parental readiness for text message. American Journal of Public Health. 100 (61): 970.)

Findings from our evaluation of baseline adherence with HPV vaccine guidelines and the relationship between vaccination and provision of other health services were presented as two posters at the 2010 Society for Adolescent Health and Medicine Annual Meeting, Toronto, Canada. In addition, a paper further describing the relationship between HPV vaccine and provision of other health services is currently being revised and soon will be resubmitted to the journal *Academic Pediatrics*.

Findings from our registry-linked text messaging intervention were presented as platform presentations at the 2010 Pediatric Academic Society's Annual Meeting, Vancouver, Canada and at the 2010 National Immunization Conference, Atlanta, Georgia. In addition, these findings will be presented again at the 2010 mHealth Summit (in Washington, DC) and to the New York City Department of Health and Mental Hygiene's Immunization Coalition in October 2010. A paper describing our registry-linked text message intervention has been revised and resubmitted to the journal *Pediatrics*.

Findings from our HPV text message reminder-recalls have been submitted for presentation at the 2011 Society for Adolescent Medicine Annual Meeting. In addition, a paper describing our text message reminders for the HPV vaccine has been submitted to the journal, *Archives of Pediatrics and Adolescent Medicine*.

In total, our MCH funded research has resulted in:

- 2 completed publications (one original article and one response letter)
- 1 articles under revision, soon to be resubmitted
- 1 article under first review
- 1 article under second review
- 3 platform presentations at national meetings
- 2 poster presentations at national meetings
- At least one future platform presentation at a national meeting
- At least one future platform presentation to public health organization

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